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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/763,785	11/13/2001	Kaveh Momeni	70031	3691

7590 02/27/2003

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EXAMINER

MCHENRY, KEVIN L

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 02/27/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/763,785

Applicant(s)

MOMENI ET AL.

Examiner

Kevin L McHenry

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-40 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 21-26, 28-32, 34-36 and 38 is/are rejected.
- 7) ☒ Claim(s) 22, 27, 30, 33 and 37-40 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Specification

1. The disclosure is objected to because of the following informalities:

On page 2, lines 16-17, the specification refers to the claims.

Appropriate correction is required.

Claim Objections

2. Claims 22, 30, and 38 are objected to because of the following informalities:

The language of claim 22 is confusing and unclear, particularly the language of line 2 that cites "...accommodated in the template device wherein by filling the template apertures...". For examination purposes the examiner interpreted this language to mean "...accommodated in the template device by filling the template apertures...".

In line 11 of claim 30 the language "...can be exposed to laser energy from the rear..." is used. It is unclear what direction the rear is or what part is being referred to. For examination purposes the examiner interpreted this language to mean "...can be exposed to laser energy from the rear of the template device...".

In line 2 of claim 38 sidewall is misspelled as "sidewalk".

The dependency of claim 38 is unclear since it cites "...one or several of claim 30...". For examination purposes the examiner interpreted claim 38 to depend upon claim 32.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 21, 22, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 1-243554.

JP 1-243554 teaches a process for placing solder balls on a bond pad arrangement of a substrate that includes a plurality of bond pads and then subsequently re-melting the solder balls on the bond pads. JP 1-243554 teaches that a template device that has a plurality of apertures for receiving solder balls is placed opposite the substrate and bond pad arrangement so that the solder balls are aligned with individual bond pads. A laser device applies a laser from the rear of the template to the solder balls in the apertures to re-melt the solder balls. Solder balls are selected from a bulk of solder balls in the template device by filling the template apertures in an aperture screen of the template. The template device acts as a container for solder balls and has walls for accommodating a quantity of solder balls and a wall that forms an aperture screen for selecting solder balls and conveying them to the bond pad arrangement (see JP 1-243554; particularly abstract and Figures 1a-1e).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 24 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over JP 1-243554 as applied to claims 21, 22, and 30 above, and further in view of Azdasht et al. (U.S.P. 5,977,512).

The former reference teaches the process described above in section 4. However, this reference does not teach that an optical scanner is used to detect the presence of solder balls or that the laser is applied by the same device as the optical scanner.

Azdasht et al. teach a process of placing solder balls onto a bond pad arrangement of a substrate and then re-melting the balls with a laser. Azdasht et al. teach the use of an optical scanning device, or sensor, to detect the presence of a solder ball on a pad and signal that laser re-melting may commence if a solder ball is present (see U.S.P. 5,977,512; particularly Figures 3 and 4; column 1, lines 8-10; column 6, lines 25-45, 64-67).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process described above by the teachings of Azdasht et al. One would have been motivated to do so in order to use a sensor to detect the presence of solder balls on bond pads and then signal that laser re-melting may commence, as taught by Azdasht et al.

7. Claims 21, 23, 28, 29, 35, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 197 39 481 in view of JP 1-243554.

DE 197 39 481 teaches a process for placing solder balls on a substrate and then subsequently re-melting the solder balls on the bond pads. DE 197 39 481 teaches that a template device that has a plurality of apertures for receiving solder balls is placed opposite the substrate so that the solder balls are aligned on the surface of the substrate. The apertures are smaller than the diameter of the solder balls. Solder balls are selected from a bulk of solder balls outside of the template device by lowering the template into a quantity of solder balls and applying a vacuum or pressure below atmospheric to the interior of the template to cause solder to suck into the aperture openings. The selected solder balls are then moved to a substrate, placed upon the surface of the substrate, and pressed onto the surface by a force above atmospheric. A laser device applies a laser from the rear wall of the template through fibers to the solder balls in the apertures to re-melt the solder balls. Therefore, the rear wall of the template is transparent to the laser irradiation (see DE 197 39 481; particularly abstract and Figures 1-4).

DE 197 39 481 does not teach that the substrate includes a bond pad arrangement.

JP 1-243554 teaches a process for placing solder balls on a bond pad arrangement of a substrate that includes a plurality of bond pads and then subsequently re-melting the solder balls on the bond pads. JP 1-243554 teaches that the bond pads serve as electrodes for the semiconductor substrate (see JP 1-243554; particularly abstract and Figure 1a-1e).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process of DE 197 39 481 by the teachings of JP 1-243554. One would have been motivated to do so in order to have provided electrodes for the semiconductor substrate of DE 197 39 481, as taught by JP 1-243554.

8. Claims 24 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over DE 197 39 481 in view of JP 1-243554 as applied to claims 21, 23, 28, 29, 35, and 36 above, and further in view of Azdasht et al. (U.S.P. 5,977,512).

The former reference teaches the process described above in section 7. However, this reference does not teach that an optical scanner is used to detect the presence of solder balls or that the laser is applied by the same device as the optical scanner.

Azdasht et al. teach a process of placing solder balls onto a bond pad arrangement of a substrate and then re-melting the balls with a laser. Azdasht et al. teach the use of an optical scanning device, or sensor, to detect the presence of a solder ball on a pad and signal that laser re-melting may commence if a solder ball is present (see U.S.P. 5,977,512; particularly Figures 3 and 4; column 1, lines 8-10; column 6, lines 25-45, 64-67).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process described above by the teachings of Azdasht et al. One would have been motivated to do so in order to use a sensor to detect the presence of solder balls on bond pads and then signal that laser re-melting may commence, as taught by Azdasht et al.

9. Claims 21, 22, 26, 30-32, 34, 35, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 197 39 481 in view of Sakemi et al. (U.S.P. 5,655,704).

DE 197 39 481 teaches a process for placing solder balls on a substrate and then subsequently re-melting the solder balls on the bond pads. DE 197 39 481 teaches that a template device that has a plurality of apertures for receiving solder balls is placed opposite the substrate so that the solder balls are aligned on the surface of the substrate. Solder balls are selected from a bulk of solder balls outside of the template device by lowering the template into a quantity of solder balls and applying a vacuum or pressure below atmospheric to the interior of the template to cause solder to suck into the aperture openings. The selected solder balls are then moved to a substrate, placed upon the surface of the substrate, and pressed onto the surface by a force above atmospheric. A laser device applies a laser from the rear wall of the template through fibers to the solder balls in the apertures to re-melt the solder balls. Therefore, the rear wall of the template is transparent to the laser irradiation (see DE 197 39 481; particularly abstract and Figures 1-4).

DE 197 39 481 does not teach that the substrate includes a bond pad arrangement, that solder balls are selected from a fill chamber that is movable over the aperture screen, or that the aperture openings are larger than the diameter of the solder balls.

Sakemi et al. teach a process of placing solder balls on a bond pad arrangement of a substrate that includes a plurality of bond pads and then subsequently re-melting the solder balls on the bond pads. Sakemi et al. teach that methods of

placing solder balls with suction pressure can lead to solder deformation and entrapment of solder within screen apertures. This reference teaches a method of solder placement that avoids this problem by using a template with a plurality of apertures in a screen that function as a selecting device. The apertures are aligned with a substrate bond pad array and a solder ball container that moves over the template to distribute solder balls into template screen apertures. The container is open towards the template screen to allow solder balls to be selected and dropped into screen apertures. The screen apertures are larger than the diameter of the solder balls. The bond pads function as electrodes for the substrate (see U.S.P. 5,655,704; particularly Figures 3 and 4; column 1, lines 9-58; . The materials of the aperture screen and sidewall of the solder container would be flexible since all materials, even high strength materials such as steel and ceramic, have some degree of flexibility and can undergo elastic deformation to an extent.

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process of DE 197 39 481 by the teachings of Sakemi et al. One would have been motivated to do so in order to provide pads that function as electrodes for the substrate and to provide a process for placement of solder balls that avoids entrapment of solder within screen apertures, as taught by Sakemi et al.

10. Claims 24 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over DE 197 39 481 in view of Sakemi et al. (U.S.P. 5,655,704) as applied to claims 21, 22, 26, 30-32, 34, 35, and 38 above, and further in view of Azdasht et al. (U.S.P. 5,977,512).

The former reference teaches the process described above in section 9. However, this reference does not teach that an optical scanner is used to detect the presence of solder balls or that the laser is applied by the same device as the optical scanner.

Azdasht et al. teach a process of placing solder balls onto a bond pad arrangement of a substrate and then re-melting the balls with a laser. Azdasht et al. teach the use of an optical scanning device, or sensor, to detect the presence of a solder ball on a pad and signal that laser re-melting may commence if a solder ball is present (see U.S.P. 5,977,512; particularly Figures 3 and 4; column 1, lines 8-10; column 6, lines 25-45, 64-67).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the process described above by the teachings of Azdasht et al. One would have been motivated to do so in order to use a sensor to detect the presence of solder balls on bond pads and then signal that laser re-melting may commence, as taught by Azdasht et al.

Allowable Subject Matter

11. Claims 27, 33, 37, 39, and 40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record does not teach or suggest a method or apparatus for placing shaped solder on a bond pad arrangement of a substrate that includes a plurality of bond pads, using a template device that has a plurality of apertures for receiving

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solder and is placed opposite the substrate and bond pad arrangement so that the solder is aligned with individual bond pads, and then subsequently re-melting the solder on the bond pads with a laser from the rear side of the solder placement template, wherein filling of the template apertures is done with a paddle-wheel device that is guiding in parallel to the surface of the aperture screen and is rotated on an axis.

Nor does the prior art of record teach or suggest an apparatus for placing shaped solder on a bond pad arrangement of a substrate by using a template device with a container for a quantity of shaped solder, with a wall of the container forming an aperture screen that acts as a selecting device for singling out shaped solder from a movable fill chamber so that the solder can be exposed to laser energy from the rear of the template device, wherein the aperture screen or the sidewall of the filling chamber are comprised of at least three layers with a flexible compression layer sandwiched between two wear-resistant layers.

Nor does the prior art of record teach or suggest an apparatus for placing shaped solder on a bond pad arrangement of a substrate by using a template device with a selecting device, a housing that forms an aperture screen that accepts shaped solder, and a transparent rear wall opposite the aperture screen, wherein the diameter of the apertures in the aperture screen is larger than the largest diameter of the shaped solder and the distance between the screen and the rear wall of the template is less than the smallest diameter of the shaped solder parts.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Azdasht et al. (U.S.P. 6,059,176), Fukasawa et al. (U.S.P. 4,871,110), Inoue et al. (U.S.P. 6,460,755), Ramos et al. (U.S.P. 6,119,927), Fjelstad (U.S.P. 6,253,992), Sakai et al. (U.S.P. 6,109,509), and Inoue et al. (U.S.P. 6,402,014) are cited of interest for illustrating the state of the art in the placement of shaped solder on a substrate.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L McHenry whose telephone number is (703) 305-9626. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



February 21, 2003



M. ALEXANDRA ELVE
PRIMARY EXAMINER